REMARKS

Claims 1 – 20 are pending. Claims 10 – 18 have been withdrawn from consideration. Claims 10 – 18 were amended to be method claims so it is respectfully submitted they should have been rejoined - not still considered withdrawn. Thus, their rejoinder and withdrawal of the finality of the rejection are respectfully requested.

Applicant thanks the Examiner for indicating Claims 3, 7 and 19 have would be allowable if rewritten in independent form.

I. The Office action rejects claims 1 and 20, citing 35 U.S.C. §103(a), US 6,004,504 to Vallomy (hereinafter, "Vallomy '504") and JP 09-005248 (hereinafter, "JP-248").

A. Claim 1

Claim 1 recites a method for pre-heating, transforming and melting a metal charge comprising metal scrap, in an electric arc furnace associated with a tunnel that transports, pre- heats and discharges said scrap, the furnace comprising a hearth and a roof through which the electrodes pass, comprising the steps of:

- weighing the furnace at least periodically to detect the quantity of discharged scrap from the tunnel delivered to and present inside the furnace itself;
- detecting the temperature of the liquid bath inside the furnace at least periodically, and
- at least the discharge delivery of the scrap from the tunnel to inside the furnace is detected by said weighing and is regulated to maintain said temperature of the liquid bath around a pre-determined value.

Thus, the invention of claim 1 provides a method to control and maintain the temperature of the bath at a pre-set value by acting on the discharge delivery of the scrap into the furnace. " On page 13, line 30 – page 14, line 1, the specification explains, "[t]hroughout the loading cycle, the weight of the furnace system and the temperature of the bath are monitored periodically, or also continuously, in order to regulate the unloading of the scrap so as to keep the temperature of the bath substantially constant."

As acknowledged in the Office Action of November 18, 2008, Vallomy '504 does not disclose weighing the furnace periodically and detecting and regulating as in Claim 1. Vallomy '504 relates to controlling bath level in a steelmaking process.

JP ‘248 discloses a method in which the furnace is weighted, and the discharge delivery of the scrap into the furnace is related to the feed rate of discharge of the molten metal from the furnace, to maintain the overall weight of the furnace to a pre-set value and avoid variations in the weight of the furnace body, and further to maintain the level of the molten metal at a substantially constant value. The discharge delivery of the scrap into the furnace is not regulated to maintain the temperature of the liquid bath around a pre-determined value.

At page 4, the Office Action states, “JP ‘248 teaches that the desired feed rate of molten metal can be obtained while variations in a level of molten metal are being prevented and much more exact operation control is attained by measuring molten metal temperature.” Even if this statement is accurate, a *prima facie* case of obviousness has not been established, because claim 1 requires “at least the discharge delivery of the scrap from the tunnel to inside the furnace is detected by said weighing and is regulated to maintain said temperature of the liquid bath around a pre-determined value.” JP ‘248 does not teach this.

JP '248 (Abstract) explains its invention measures weight of raw materials supply and furnace body weight JP '248 to determine a feed rate of molten metal. By feed rate of molten metal it means the rate of discharge of molten metal from the furnace to feed a downstream operation. Then the raw material supply rate and molten metal feed rate are controlled to maintain the molten metal feed rate at a present value while variations in furnace body weight are being kept at zero. Thus the desired feed rate is obtained while variations on molten metal level are prevented. This is further explained at JP '248 paragraphs 0011 and 0012.

The Abstract separately states "If an automatic control system for a temperature of molten metal is adapted to be combined with the above method, this is further preferable." This clearly indicates the weight measuring is separate from the temperature measuring. JP '248 claim 3 also indicates weight measuring is separate from the temperature measuring.

JP '248 controls temperature by adjusting electric power. This is entirely different from the present invention. At paragraph [0013], JP ‘248 states the molten metal temperature is inputted into an operation and a controller, which self adjusts the electric

power unit so that molten metal temperature may be in agreement with a preset value. The temperature control provided by JP '248 is not linked to or related to the discharge delivery of the scrap. JP '248 does not correlate the rate of discharge of the scrap inside the furnace to variations of temperature. JP '248 does not adjust the rate of discharge to maintain the temperature to a pre-set value.

It is likely that most systems of melting metal inside a furnace are provided with systems to measure the temperature of the bath. However, the temperature of the bath of molten metal can be influenced by a great number of parameters in a melting process, for example, by changes in the supply of electric power, by variations in the amount of gas, oxygen, carbon or other additives which are introduced in the bath, by the thickness of the layer of slag above the bath, and by other functions or actions which happen inside the furnace.

The present application correlates the rate of discharge of the scrap inside the furnace to variations of the temperature of the bath. At page 7, from line 28, the present application explains, "the value of temperature of the molten metal is used to regulate the melting profile and the loading of scrap inside the furnace, so as to keep said temperature always around a pre-set value." In other words, according to the present invention, the measure of temperature is correlated to the rate of discharge of the scrap in the furnace so as to avoid abrupt changes in the temperature of the bath, for example, due to the introduction of cold scrap. None of the documents cited in the Office Actions suggests this correlation.

B. Claim 20

Claim 20 further distinguishes over the references. Claim 20 recites slowing the speed of scrap discharging into the furnace if a lowering of the temperature with respect to the pre-determined value is detected and increasing the speed of scrap discharging into the furnace if a raising of the temperature with respect to the predetermined value is detected.

Vallomy admittedly does not do this.

The Office action at page 2 asserts JP [0002] discloses the amount of feeding, and the amount of energization to the electrode are controlled. The Office action further

asserts the metal temperature is controlled based on the gravimetry means 5 and 7 for the furnace and the feeder respectively, and the electrode, citing paragraphs [0010 and 0013]. Thus, the Office action concludes it would be obvious to slow the speed of scrap discharging into the furnace if a lowering of the temperature with respect to the pre-determined value is detected and vice versa.

However, as explained above, JP '248 (Abstract) explains its invention measures weight of raw materials supply and furnace body weight JP '248 to determine a feed rate of molten metal. Then the raw material supply rate and molten metal feed rate are controlled to maintain the molten metal feed rate at a present value while variations in furnace body weight are being kept at zero. Thus, the desired feed rate is obtained while variations on molten metal level are prevented. This is further explained at JP '248 paragraphs 0011 and 0012.

Moreover, as explained above, the JP '248 Abstract and JP '248 claim 3 indicate weight measuring is separate from the temperature measuring. Moreover, as explained above, JP '248 controls temperature by adjusting electric power.

II. The Office action rejects claims 2, 4, and 5, citing 35 U.S.C. §103(a), Vallomy '504, JP '248, and US 5,099,438 to Gulden, Jr. et al. (hereinafter, "Gulden").

The additional references are cited only with regard to features of dependent claims 2, 4, and 5, and do not cure the deficiencies discussed above with regard to rejection I. Thus, applicant respectfully submits that the proposed combination does not establish a *prima facie* case of obviousness.

Moreover, claim 4 recites the feed of electric power is interrupted before tapping for a time up to 5% of the overall time of the cycle. Neither reference discloses this.

This relates to the overall process as disclosed at page 13, line 30-page 14, line 15 of the present application having a first cycle (loading cycle), in which the weight of the furnace system and the temperature are monitored, and the unloading of the scrap is regulated to keep the temperature of the bath substantially constant. When the quantity of scrap has been reached, then in a second cycle (melting cycle) the temperature of the bath is made to increase until the desired value for tapping is reached. Then scrap discharge into the furnace and electric feed into the furnace are interrupted. Then in a

third cycle scrap tapping begins. Once the discharge of scrap into the furnace is interrupted it is no longer possible to control temperature by adjusting scrap discharge rate.

Neither Vallomy nor JP'248 mentions a pre-set value of temperature must be maintained during the pre-melting phase, i.e. during the loading cycle in which the scrap is discharged into the furnace. Neither Vallomy nor JP'248 implies it is obvious to maintain the temperature to a pre-set value during the discharging cycle (first loading cycle) by regulating the speed of discharge.

III. The Office action rejects claim 6, citing 35 U.S.C. §103(a), Vallomy '504, JP '248, Gulden, US 4,564,388 to Vallomy (hereinafter, "Vallomy '388"), US 3,772,000 to Hyde et al. (hereinafter, "Hyde"), and US 4,020,026 to Engledow (hereinafter, "Engledow").

The additional references are cited only with regard to features of dependent claim 6, and do not cure the deficiencies discussed above with regard to rejection I. Thus, applicant respectfully submits that the proposed combination does not establish a *prima facie* case of obviousness.

IV. The Office action rejects claim 8, citing 35 U.S.C. §103(a), Vallomy '504, JP '248, Gulden, and US 4,679,773 to Wunsche (hereinafter, "Wunsche").

The additional references are cited only with regard to features of dependent claim 8, and do not cure the deficiencies discussed above with regard to rejection I. Thus, applicant respectfully submits that the proposed combination does not establish a *prima facie* case of obviousness.

V. Conclusion

Please charge any shortage in fees due in connection with the filing of this paper, including any shortage in Extension of Time fees, to Deposit Account 14.1437. Please credit any excess fees to such account.

The present application is in condition for allowance, and applicants respectfully request favorable action. In order to facilitate the resolution of any questions, the Examiner is welcome to contact the undersigned by phone.

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